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THE AGRICULTURAL STUDENT

OHIO STATE UNIVERSITY, COLUMBUS, OHIO



APRIL 1917

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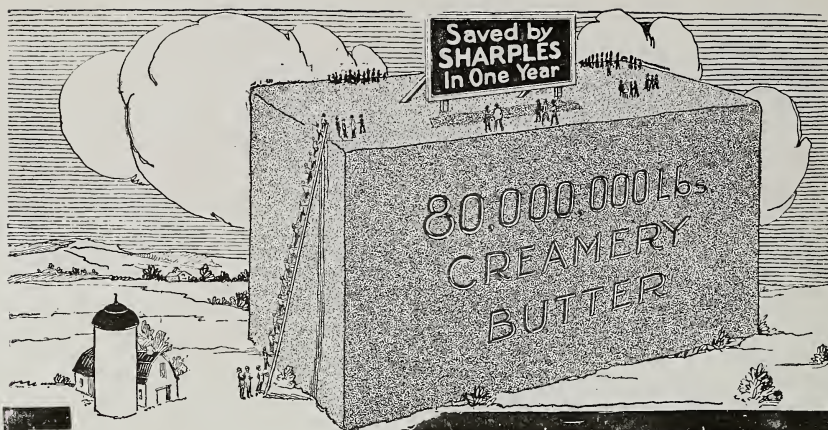
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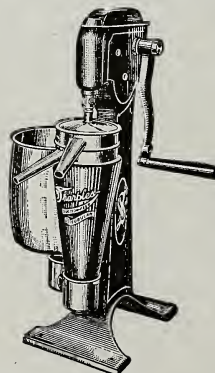
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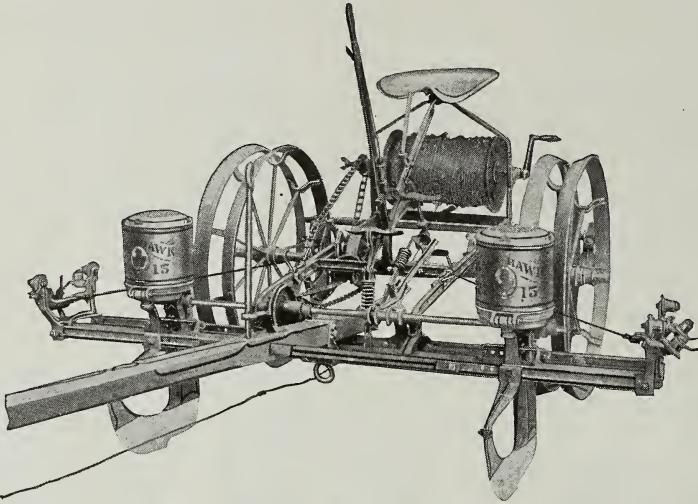
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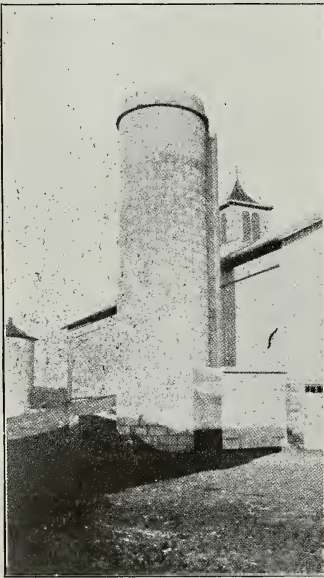
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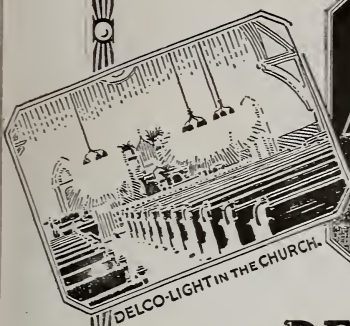
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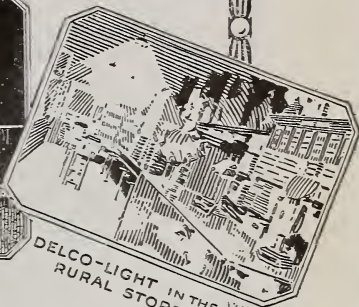
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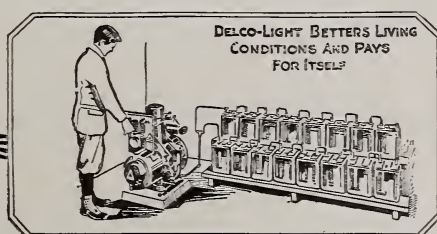
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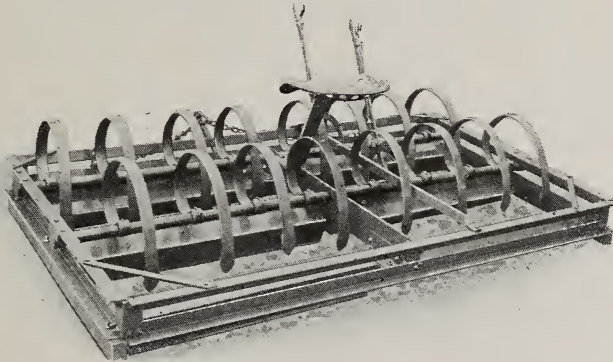
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Students Plowing With Tractor on University Farm



Students Shearing Sheep

THE AGRICULTURAL STUDENT

Vol. XXIII.

OHIO STATE UNIVERSITY, COLUMBUS, APRIL, 1917

No. 8

SILO CONSTRUCTION FOR THE FARM

Factors That Must Be Given Consideration in the Selecting of a Type Suitable to the Locality; Requirements in Building With Concrete Which Must Be Observed for Success

PROF. F. M. WHITE, Department of Agricultural Engineering, University of Wisconsin

THE pros and cons of the various types of silos have been argued time without end. There are some good and some bad points for every type of silo which has been designed thus far. Questions have even been raised regarding the feasibility of a silo. The most of these objections are opinions based upon a limited experience. It is quite true that there have been failures of a few of practically every type of silo in use today. These failures in many cases can be easily explained.

So far as construction of silos is concerned a majority of materials which are available for any type of building can be used. Their successful use will depend upon two absolute requirements. First, good silage can be produced only in practically an air-tight structure. Second, the silo should be round and smooth and perpendicular from top to bottom, so as to prevent air pockets from forming during the settling of the silage.

There are other important features such as permanency, frost resistance, fireproof construction, appearance, simplicity of construction, first cost and expense of repair to be taken into consideration.

In selecting any type of silo to build, three factors should be given serious consideration. A type suitable to one locality may be out of the question for

another on account, perhaps, of the inability to secure materials at any reasonable price. A silo in Ohio of a certain type perhaps could be built at much less cost than in Wisconsin, so no one can say that any one type of construction is universal or even is superior to every other type.

The wood stave silo comes nearest to being a universal type. Next to wood is the solid wall concrete silo. It has, in addition to the essential requirements necessary to a successful silo, several decidedly important features in addition, such as being permanent, fireproof, low in upkeep cost, and in many localities low in first cost.

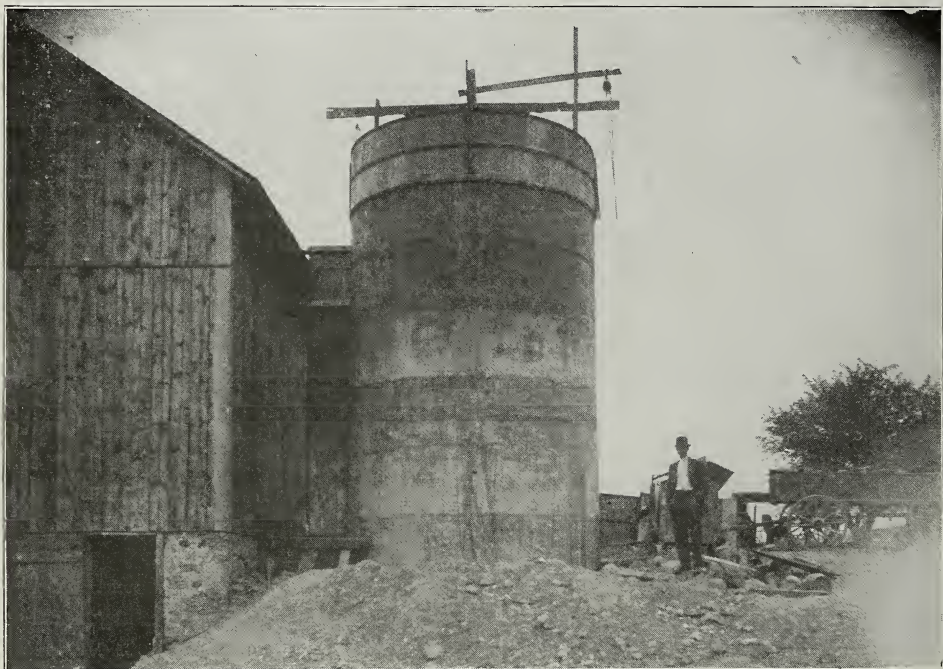
There has been circulated widely more untrue stories regarding failures of concrete silos than for most any other type of construction. Many of these stories have originated in Wisconsin where there are more silos than in any other state in the Union. From a census taken by the State Department of Agriculture of Madison, Wisconsin, their report shows that for 1914 there were 47,165 silos in Wisconsin. In securing this silo census the question was asked as to what material was most commonly used for building silos. Thirty-seven reported in the northern division of the state that wood is most commonly used, and 17 reported that concrete was the most popular material.

In the central division, 35 reported that concrete was the most common building material, 24 wood, 2 tile, and 1 brick. In the southern division, 26 concrete, 20 wood, 4 brick and 4 tile. These figures indicate that concrete silos are quite as satisfactory as any other type of construction.

There are certain essential principles or requirements in building concrete silos which must be observed if this

ly proportioned. If it is to be permanent it must be properly reinforced.

Many different shapes of iron and steel are used in reinforcing concrete silos. Each have their special advantages which depend largely upon the experience of the builder. For the small contractor cable made by twisting different sizes of wire together can be easily secured and easily handled. It should be laid in the concrete in the



Completing a Home Made Concrete Silo

type is to be a success. Concrete is a permanent building material, it is fire-proof and in many sections of the United States can be built as cheaply as any other type of construction. There are almost as many ways of using concrete as there are of using wood for silo construction. If a concrete silo is going to fulfill the first requirement of a silo it must be air-tight. To secure this result, it is necessary that the proper attention be given to the selection of good, clean materials proper-

form of a continuous band. A satisfactory size of wire is ordinary No. 9 telephone wire. Old barb wire should never be used because it is not strong in tensile strength and is very unwieldy to handle.

In placing the reinforcement it should be laid about one inch from the outside wall and if a continuous type of door is used in the construction the reinforcement bands should be wrapped around a vertical band or the inside of the door. Another rod which acts as a

ladder is tied to the vertical rods. These rods are usually placed $1\frac{1}{2}$ to 2 feet apart. Vertical reinforcement generally is not necessary except in the larger sizes of silos.

Another form in which concrete is used for silo purposes is the concrete block. These have been used successfully when well built. The great difficulty with a concrete block silo is the neglect on the part of the block builder in making a good block which is air tight.

The cost of building silos varies so in different states that the price in Wisconsin will probably not apply to conditions in Ohio. Commercial forms for building the solid wall silo have been developed so that contractors can put up a silo in a short time. Home-made silo forms which have been successfully used can be built for from \$75 to \$100. Several silos can be built with these forms so that the cost per silo is small. The average cost of materials used in building a solid wall concrete silo is about \$1.00 per ton capacity. To

this cost should be added labor and cost of forms.

Any type of silo to be satisfactory will require some attention. In all types of silos in cold weather, doors, windows, and ventilators should be closed. Since freezing naturally takes place first near the walls where the lowest temperature prevails, the silage nearest to the walls should be kept much lower than that at the center. In extreme cold weather serious trouble from freezing can be prevented by covering the silage with old carpets or blankets.

There have been suggestions made that concrete silos should be washed on the inside every few years with coal tar or creosote. It has been found that coal tar asphalt is not a preservative for concrete and in fact, will cause deterioration. The best wash that can be applied is either some one of the various patent paints which are manufactured by a number of reliable companies, or a wash made of cement and water.



Silo on Farm of John D. Owens, Owens, Ohio

A SQUARE DEAL FOR FARMER AND TRACTOR

How This Source of Power Can Be Utilized Most Economically

PROF. A. H. GILBERT, Department of Farm Mechanics, Purdue University, LaFayette, Indiana

A FARMER has a right to expect a certain amount of economical service from his tractor, provided it is given reasonable care. In other words, a farmer purchasing a tractor should require a guarantee from the company that it is capable of developing rated horsepower at the belt wheel and will pull a definite number of pounds at the drawbar at a given speed. At the same time the purchaser should see that it is given reasonable care.

The economical service to be obtained from a tractor may be measured by reducing the expense of operation, by increasing acreage farmed, or by increasing the yield. The majority of tractors are purchased for the express purpose of having more power available at busy seasons without having so many horses to feed during the entire year, and also to assist in solving the problem of hired help. There are many farm operations where one man with a tractor can do the work of three or four men and several horses. The work must be planned, therefore, so that the tractor will do all of the heavy work about the farm, leaving the lighter operations, which the tractor cannot do economically, for the horses.

In order to lessen the expense of operation the number of horses should be reduced to a minimum. Only such a number as are necessary for corn cultivation and which can be used to advantage during the greater part of the year should be kept. Actual data obtained from 120 Indiana farmers, who have used tractors for an average of 14 months on farms averaging 300 acres under cultivation, shows a decrease of four horses per farm. It is not recom-

mended that a sufficient number of horses be disposed of to offset the price of the tractor, but in order to make the tractor reduce expenses, it is necessary to keep the tractor busy and dispose of all horses which cannot be used to advantage under normal conditions.

Rather than to decrease the number of horses or other equipment, many farmers are increasing the acreage farmed with the same machinery. By the use of the tractor they are enabled to tend a greater number of acres with the same effort and to increase their profits accordingly.

Over 60 percent of the Indiana farmers, from whom the above data was collected, reported that their yields had been increased since using the tractor. There are occasions on every farm annually, when weather conditions prevent preparing the seed bed properly, planting the seed in season or harvesting the grain. At such times the tractor can be used long hours or night and day making it possible to thoroly prepare the seed bed and plant the seed in season. In some locations early plowing is considered essential for large yields of wheat. Very often at such times the ground is exceedingly hard and the temperature is such that plowing to the proper depth with horses is impossible.

In Texas the condition of the soil is such that it is next to impossible to plow when dry. Furthermore, when wet the soil becomes so waxy that even a disc plow will not scour. Due to this fact the large sizes of tractors are playing a great part in the yields of small grain which they are getting at the present time.

Length of Life of the Tractor.

The life of the tractor can best be measured in hours of service and not in years. Engineers from some of the leading manufacturers inform us that the life of a tractor depends upon a large number of factors, such as, material used in construction, workmanship, balance, bearings, etc. For the

greater the profits on the investment.

Care of the Tractor.

Reasonable care which a farmer should give his tractor in order to receive the best service may be summed up under the following points: Careful lubrication, speed of the motor, overloading tractor, adjusting and repairing, and shelter.



A Square Corner Made With a Tractor

good medium priced outfits, however, approximately 5000 hours of service should be expected. If the tractor is used for about 70 days during the year, it should last in the neighborhood of 7 years. If, on the other hand, it is used for 50 days each year for 10 hours per day it should last about 10 years. It may be repeated, therefore, that to be successful the tractor must be used. The greater the hours of actual service obtained from the machine annually the

The matter of lubrication is an important one. The direction book should be consulted often and the oils recommended therein should be used, if possible. Men have operated automobiles for 4 or 5 years and have never found some of the important oil holes. The tractor, however, would not stand up under such conditions because the majority of its power is used continually and all parts need thoro lubrication. A good rule to follow is, that wherever

two surfaces come together, one or both of them moving, they need lubrication. The amount and kind of lubricant depends upon the speed of the moving parts, the size of bearings, the pressure exerted and the temperature. The company manufacturing the machine should know best what grade of oil is necessary for the various parts.

Not long ago the writer was called upon to investigate the cause of a burnt out bearing on a kerosene engine. On examination it was found that a very light grade of automobile oil was in the lubricator instead of the heavy heat resisting oil recommended by the company in their instruction book.

The motor is balanced to do its best and most efficient work within a given range of speed. It has been tested and found to develop the rated horsepower at the normal speed published in their catalog. For this reason the governor should not be changed to make the motor exceed its rated speed. When the motor is standing idle, it should be throttled down slowly to prevent excess vibration, and at the same time to economize on fuel.

When the motor is in first class condition, it may develop its rated horsepower with apparent ease and it is a common failing for both purchasers and agents to expect too much of the machine. It is difficult to determine at all times how much power the machine is developing, but an apt operator can soon tell by the sound of his machine when it has all it should pull. Many of the first machines on the market were considered failures because they were extremely heavy and their efficiency at the drawbar on soft ground very low, consequently they were usually overloaded.

The automobile has been successful, because only 15 to 20 percent of its

power is used on the average, while the tractor is required to exert 80 to 100 percent of its power continually. The tractor is built for heavy duty service, but many are strained to their very limit and these need repairs first. When purchasing it is advisable to get ample power for the work required. Many farmers purchased 8-16 tractors, expecting them to draw three 14-inch plows under all conditions, but some were disappointed. The draft of a 14-inch plow bottom cutting 7 inches deep averages 400 to 600 pounds draft or for 3 bottoms 1200 to 1800 pounds. The 8-16 tractor at full load should be capable of exerting a force of 1500 pounds at the drawbar at a rate of 2 miles per hour or 1200 pounds at the rate of $2\frac{1}{2}$ miles per hour. It is a mistake for manufacturers, therefore, to advise a three bottom plow under such conditions, even though one bottom can be removed. A 10-20 or a 12-20 tractor is the minimum size tractor which should be used with 3 14 inch plows on the average farm. The manufacturer, after all, has little business guaranteeing any definite number of plows for their tractor until thoroughly familiar with the type of land. As stated above, he is safe in guaranteeing his machine to pull a definite number of pounds at the drawbar at a given speed.

Many purchasers are of the opinion that the tractor requires practically no attention. All that is necessary is to put a little gasoline or kerosene in the tank. To fill fuel tanks, lubricate the tractor thoroughly and examine the machine for loose or wearing parts requires considerable time. The art of successful operation lies in the ability of the operator to keep all parts in good adjustment and repair, also to notice the need of such adjustments before damage is done.

During stormy weather the tractor

can be overhauled, the carbon removed, valves ground, crank shaft and connecting rod bearings adjusted. Painting the woodwork occasionally prevents rapid decay of all such parts exposed, and shelter for the machine when not in use is one of the easiest and cheapest means of preserving the life of the tractor.

In order to obtain the best results, the farmer and manufacturer must work more closely together. For years the manufacturers have been giving public demonstrations for the farmer's benefit and at the same time they studied farm conditions for which they are building their engines. They are also

seeking information from the agricultural colleges in order that they may more perfectly adapt their machinery to the farmer's needs.

It is the duty of the farmer, on the other hand, to meet the manufacturer half way, to read his instruction book over until thoroly familiar with every detail, and, if possible, to attend a gasoline engine short course or tractor school for a sufficient length of time to become familiar with the principles of the internal combustion engine. Then he can operate his machine intelligently and come more nearly receiving the most efficient service it is capable of rendering.



Tractor Drawing Grain Binder

EXPERTING THE GRAIN BINDER

How Keeping Harvesting Machines in Repair Offers Field to Trained Men

RAY I. SHAWL, Department of Farm Mechanics, University of Illinois

IN considering the subject of experting the grain binder, let us first define the term. The binder expert is a trained man set out by an implement manufacturing, or sales company, to set up new binders and to keep the old ones in good running condition. This appears to be a comparatively easy task, but when it is considered that the expert must satisfy his company, the local dealer, and the farmer who purchased the machine, it is readily seen that he has a difficult task.

The binder is a complicated piece of machinery and as such it is not readily understood by the majority of dealers and farmers, and in many cases even the salesman knows comparatively little about the mechanical construction. When the binder gets out of order, the farmer attempts to fix it, but not knowing what to do he only aggravates the trouble, and finally condemns the binder as worthless. This information he soon imparts to his neighbors and before long this certain implement has a bad name among the farmers. The manufacturer, by securing the services of an expert to keep the implements in working order and to instruct the dealer and farmer in their use and care, upholds the reputation of his machine and thereby increases its sales.

With an understanding of the nature of the work of the expert, let us now consider the training necessary to fit a man for such a position. At Illinois, the student preparing himself for expert work must take the following courses: general farm machinery, which gives him a working knowledge of farm machinery; farm power machinery, which gives him the principles and

operation of the gasoline engine; forge work; and an advanced course in binder work. In this work he tears the binders down completely and then rebuilds them, familiarizing himself perfectly with the details of their construction. Here he learns the tricks of the trade, such as easy and quick methods of construction, and the special adjustments on each machine necessary to remedy the troubles. This is the knowledge he is paid for knowing. While he is striving to master the machine itself, he gradually learns to use his tools quickly and skillfully. He has a partner in the laboratory which he must boss part of the time and here he learns to use both his head and hands at the same time. Besides the training on binders and binder heads, he must also be familiar with mowers, rakes, and hay loaders, for he is frequently called upon to assemble or repair these machines.

We find that in other professions all men are not capable of performing the same duty with the same degree of efficiency, so we find that in experting all men do not make good experts. One of the first qualifications of the expert is an inclination toward the work and this must be accompanied by a strong and robust physical makeup. Along with his mechanical ability he must have a natural ability to solve and fix the troubles he meets. He must be a student of human nature and capable of quickly judging and handling men, from the dealer down to the small boy who is sent to help him. His training in knotter-head troubles has fitted him to know instantly the causes of the trouble from the failing band, and just what adjustments are necessary. In

all his work he must show speed, thoroughness and reliability.

A word must be said concerning the personality of the expert for it plays an important part in his success. He must be neatly dressed and well appearing, two very important factors in a man's advancement. He must possess a dominant personality, but must exercise it in a quiet tactful manner. He must have absolute control of his tem-

perament. In the latter part of June, he is given a route that covers a week's time, allowing him to return on Saturday evening. He reports in person Sunday morning for his next week's route. Here is the place where the expert is placed entirely upon his own resources and his real worth developed. The first work is the assembling of binders from the shipping crates at the various dealers where he is to report. He arrives



The Binder Offers Problems For the Trained Man

per for there are many times when his patience will be sorely tried, and if he loses his temper he will make enemies for himself and his company. He should endeavor to make himself congenial under all circumstances, and if he will look for it he will find a humorous side to most all his experiences. It is this sense of broadmindedness that gives added pleasure to the work.

The interesting part of the expert's work begins when he gets into the field. When he reports at headquarters, usu-

ally in a little town, looks up the dealer and introduces himself as the binder expert sent there to set up his binder. After considerable delay the dealer will show him the machine and rather than hire a helper the dealer will do the work himself. This is one of the most taxing conditions on the expert's self control. The dealer is constantly being called away to wait on customers and the expert is left to get along the best way he can, finishing the binder in time to catch his next train. An ordinary

helper is willing to be bossed, but it is not wise to dictate to the dealer. When the binder is finished the expert gives it a close inspection to see that it is in proper working order, for he is responsible for the success of the machine. This construction work continues until the cutting season begins and then the expert has his first chance to test his ability to locate and remedy the binder troubles. Very often he is present to start a new binder and to give directions for its operation. The trouble "fixing" is one of the most taxing, but also one of the most interesting parts of the expert's work. He is rushed from place to place in answer to hurried trouble calls. If he is very much delayed in arriving he enters the field to find the farmer in an advanced state of wrath because his grain is ready to cut and the binder is not working. Here the expert must use his common sense. He finds out from the farmer, if possible, how the binder has been acting, and with this information he looks over the situation and rapidly and accurately diagnoses the trouble, which he immediately knows how to remedy. It may be a hot day and he must work in the sun, but soon he has the binder working smoothly, and after a couple rounds around the field, he leaves the farmer in a soothed state of mind and is happy himself to know that he has made good. In some cases the binder cannot be fixed, and the expert may be driven from the place, but he must not lose his temper.

The expert is also called upon to set up and adjust mowers, rakes and hay

loaders, and in some cases he is called upon to set up a machine with which he is not familiar. If he is successful the expert usually travels north with the harvest season and finishes his work in the northwestern states or in Canada. When the season is over, the expert returns home with a healthy coat of tan and a scarred and grimy pair of hands, but with the satisfaction that he has had a chance and has made good.

The outlook for the future of the binder expert is not very promising at present. The present war has materially cut down the export trade to the European countries, and as a result has cut down the output of the factories. During the summer months when the work is slack at the factory, the idle men are sent out into the expert work. Last summer these men were sent out all thru the Northwest and as the college man moved north he found that these men had taken his place. As a result the working season was only a few weeks long and the expert soon found himself out of work.

However, when the war is over and normal conditions are again resumed, the indications are that there will be a considerable demand for experts in this country and abroad. Another factor that is working against the future of the expert is the policy of the manufacturers to educate the dealers and farmers to set up and repair their own machines. This is not so convenient for the dealer, but is one more step by the company toward greater efficiency in the production of their implements.

CISTERNS AND THEIR USES

Constructing a Cheap and Economical Water Supply for the Farm

FREDERICK W. IVES, Department of Agricultural Engineering, Ohio State University

A SAFE, adequate, and satisfactory water supply is one of the essential factors on the modern farm. Sanitary conveniences in the home and water supply for stock have both been instrumental in the development of various means for providing and storing water. Many devices for this purpose are satisfactory but at the same time costly, and in some cases, uneconomical.

Under certain conditions, large storage cisterns are providing means for a fairly cheap and economical water supply. There are three typical cases where this is particularly true. The first and easiest means of filling a cistern is from the roofs of large buildings. The second, the hydraulic ram which by working 24 hours each day in connection with the storage cistern will supply water during the waking hours of man and beast. Then there is the much neglected windmill, one of our cheapest sources of energy, fitful and uncertain it is true, which, in connection with the storage cistern to bridge the gap from breeze to breeze, is a very satisfactory method of water supply.

Take, for instance, the rainfall on the roof of a barn 40 by 60 feet, or 2400 square feet of surface. The mean annual rainfall in Ohio is about 40 inches. Allowing for showers that barely wet the roof, evaporation, and leakage, say 30 inches of rain annually would find its way to the cistern. This makes a total of 6000 cubic feet or 45,000 gallons of water, enough to water 10 thirsty head of cattle an entire year. The cistern would not necessarily have to be large enough to contain this amount of water, but simply of a capacity to tide over the period of longest expected drought,

which might be 8 to 10 weeks, possibly one-fourth of the total annual expected rainfall.

It is possible to construct the cistern so that in all but the most unfavorable locations, it may be emptied by gravity. Sometimes this may be done with a cistern below grade, sometimes it will be necessary to erect an upground cistern. The latter is becoming more popular as it has many of the advantages of an elevated tank with but few of its disadvantages.

The most popular form of storage cistern below grade is that located in the approach to a bank barn. It is thus below grade and hence in less danger of freezing, yet elevated enough so as to be emptied by gravity. At the same time its roof or covering of reinforced concrete serves as an excellent pavement for the approach.

Where a rise of ground is fairly close, a cistern may be sunk in the hill. This cistern would be more suitable, of course, for storing water from a hydraulic ram or wind driven pump than that from the roofs of structures.

The upground cistern, one that is built wholly or partly above grade line, is one of great possibilities. It may be built close to the barn or between two barns, and, being fairly high, will furnish head enough to force water for a considerable distance. It may be emptied by gravity. The danger from freezing is not serious for usually so large a quantity of water would remain above freezing for some time. The motion caused by the withdrawal or addition of water will also serve to prevent excessive freezing.

Compared with the common cistern,

it will cost but little more. It requires little or no excavation as is the case with the dug cistern, but it does require a good foundation and floor. The wells will require about the same amount of material in either case, the capacity of each being equal. However, the upground cistern walls require reinforcement, as the walls of the cistern below grade are subjected to about equal pressure on either side and hence have little bursting stress. The roof of the upground cistern may be made more cheaply than the arch or cover slag of the common cistern.

If a cistern below grade starts leaking, it is difficult to locate the bad spot, especially should the leakage be toward the outside. Leaks inwardly are hard to stop as the ground water pressure is constant and crowds off patches. The construction of the upground cistern makes it fairly leakproof where reasonable attention is given to good workmanship. Thus weighed, the advantages are fairly even, the advantage of emptying by gravity being for the most part with the upground type.

The cistern below grade is ordinarily constructed of a single course wall of brick, plastered up with a Portland cement mortar, the whole depending for strength mainly on the supporting earth bank. A cement mortar bottom is generally provided. The top is arched or covered with a slab of reinforced concrete.

The upground cistern may be constructed of brick, tile, cement blocks, or monolithic concrete, all of which must be properly reinforced with steel or iron rods or hoops. Silo blocks are being used to a considerable extent for cisterns, the only change from the silo being the omission of doors. Monolithic concrete cisterns are built with the aid of silo forms, as a rule, altho a new

development in which expanded metal sheets are bent to the curvature of the proposed tank wall and set up and secured so as to form two concentric rings from 4 to 8 inches apart, depending upon the height. The space between is then filled with a medium dry mixture of 1:2:4 concrete, well tamped. The outer and inner surfaces are then plastered with a 1:2 mortar to which 10 percent of hydrated lime has been added. The result is a water tight tank, properly reinforced and made without the use of forms.

In all forms of upground tanks, especial care must be taken to properly reinforce the bottom and to bind the sides and bottom by means of bending and extending the floor reinforcements up into the walls.

In view of present costs, an upground cistern of one of the types above described would cost about the same as a cheap wood or galvanized iron tank. A good wood or galvanized tank would cost considerably more and would have to be provided with a suitable foundation. Where one has concrete aggregate of good quality close at hand and can rent forms cheaply, a monolithic tank will be economical. Under some other conditions brick or tile, may be most satisfactory.

TABLE OF CAPACITY OF CISTERNS

Gallons	Barrels	Inside	Clear
		Diameter Feet	Height Feet
1000	32	6	5
2000	64	6	10
2000	64	7	7
3000	95	8	8
5000	158	10	11.5
10000	316	12	12
15000	475	12	18
15000	475	14	14
16000	500	14	15.5

AGRICULTURAL ENGINEERING IN CONNECTICUT

Use of Improved Machinery Made Difficult Because of Stony Soil

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BECAUSE of the stony soil, agricultural engineering conditions in Connecticut are decidedly different from those in the Middle West. It is hard for one to get a proper appreciation of a stony soil except by actual field operations. Some Connecticut farms are covered with stones, varying in size from small "nigger heads" up to enormous boulders, so thick that you can almost cross the farm walking on stones. Of course conditions as bad as this do not exist on many farms at the present time, because they have been clearing their best fields of stones for the last 200 years, and using them to build walls around these same fields. One discouraging feature of this work is that each winter's heavy freezing, heaves more to the surface.

When the farms were originally cleared, only small irregular patches were attempted at a time and the stones were removed to the nearest out of the way place which naturally was at the edge of the field. Here they were piled up and formed a cheap, efficient and durable fence. The wall around a fair sized field is often 5 or 6 feet broad, 3 or 4 feet high and they usually extended as far into the ground.

The small stony fields offered no very serious obstacles to successful farming as practiced by the early settlers as most of the work was done by hand, but the advent of modern farm machinery has altered these conditions. Rapid and efficient transportation following the opening up of the West forced the New England farmer into a fierce competition with most of the odds against him. This has resulted in a discontinuation of crop production over large

areas which are now overgrown with native trees.

Two things have always been in the New England farmer's favor, closeness to markets and comparatively cheap labor. These tended to offset somewhat the better conditions for farming in the West but now labor is not only exorbitant in price but cannot be secured for farming purposes. The present high price of labor is due largely to war conditions, but even in normal times, labor is getting so expensive that average farm conditions will have to be improved to make it profitable.

One element in the solution of the problem of successful farming is more efficient use of farm labor which means among other things the use of modern and up-to-date farm machinery under better conditions. Three questions are invariably asked by students and farmers: Will this machine operate successfully on stony fields? Can I afford to buy this machine for my small farm? Can I operate this machine economically in my small fields? The answer to these questions is usually "no." The farmer or student must be shown that before he can expect to profitably operate his farm, it must be cleared of stones and the small irregular fields combined into larger and more regular ones. But it costs money to pick the stones off of a field, and move the stone walls and no one knows it better than the farmer who must raise the necessary funds for carrying on the work.

One of the problems in agricultural engineering work in Connecticut at the present time is to encourage the use of larger machines on those farms that are sufficiently large and free of stones, of

which there are many. Many of the farmers use one horse corn planters to plant 15 or 20 acres of corn, and later cultivate it with a one horse cultivator where a two horse planter and cultivator could be successfully used.

It is the common practice when hitching up three horses to hitch the third horse tandem and when the men are told it is better to hitch them abreast, they immediately ask how to do it. The same is also true of four horse hitches. The farmers are now realizing more than ever the necessity of having one man drive more horses.

Oxen are still used quite extensively for farm draft animals, and in many places the conditions justify their use. They will work successfully on a stony field where a team of horses would be continually breaking harness and machinery. Also an ox will increase steadily in value the first 2 or 3 years he is worked, his cost of keep is less than that of a horse, and his harness is nothing but a yoke and a log chain.

Oxen are often used for mowing, especially in swampy land. Most mowers are geared up to do their best work at the average speed at which a horse walks; an ox, of course, walks much slower and the machine, in order to do equally satisfactory work should be geared somewhat higher which point has been given due consideration by the local manufacturers of such machines.

Very little drainage has been done in Connecticut as the stony soil makes digging the trenches both difficult and expensive. The cost of digging the

trenches for tile drains is from 2 to 3 times greater in stony soils than in soils free from stones. Most of the soil is more or less sandy and consequently fairly well provided with natural drainage, but there is much swamp land formed by pockets or slight depressions that could be profitably improved by drainage. It is almost impossible to find an experienced ditcher, and the farmers as a whole know very little about the technique of laying a tile drain, but they are ready and willing to be told.

An interesting experience the writer has had lately was an extension trip in farm drainage. By way of an object lesson, a small upland plot, about half of which had been drained with a stone drain, was visited. The drained land had an excellent stand of grass while just over the fence on the undrained land it was impossible to raise anything but swamp grass and scrub trees. After this object lesson the men became so interested and asked so many questions that the writer missed his train.

Under-drains are often constructed of stones gathered off of the field, and if properly constructed work efficiently for many years, probably as long as tile drains if the outlets are kept open.

Do not conclude from what has been said that the entire state is stony and rough, for there are several areas, the Connecticut River Valley being the largest, where the soil is as level and as free of stones as any prairie soil, but a larger part of the state is more or less rough and stony.

HOT AND COLD WATER FOR THE HOME

Convenience Offered by Simple System Which Can Be Installed at Low Cost

VIRGIL OVERHOLT, Department of Agricultural Extension, Ohio State University

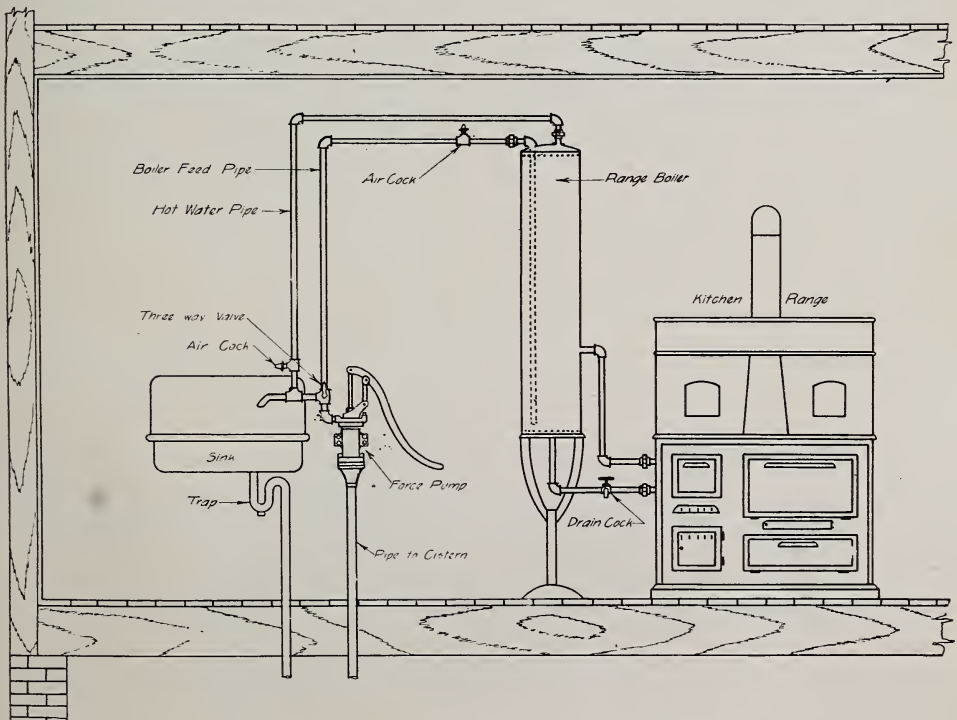
A GREAT deal of effort has been spent in developing elaborate water supply systems for country homes, while little attention has been given to the man of limited means. The accompanying cut shows a simple and efficient water supply for the kitchen that can be installed for from \$30 to \$35. Quite a number of such installations are in use in Ohio farm homes where they are attracting considerable attention.

The system consists essentially of a kitchen sink, a force pump and a range boiler which are connected up as follows:

The top of the sink is about 34 inches above the floor. Any ordinary kitchen force pump can be used, altho one with a bracket for securing the pump di-

rectly to the wall is to be preferred because it eliminates the necessity of a supporting stand and there is less opportunity for dirt to collect. A 1-inch suction pipe may be used if the pump is located directly above the cistern, but a one and one-fourth inch pipe is better if sharp bends are necessary. Three-quarter inch pipe is used from the pump to the range boiler, connected up as shown in the cut.

The bottom of the range boiler should be about level with the top of the kitchen sink. This will cause a better circulation thru the water front in the kitchen range than if the boiler were located lower and in addition makes it possible to draw nearly all the water out at the sink without pumping. If



Plan of a Simple Hot and Cold Water System

a regular water front cannot be secured, a coil of three-quarter inch pipe placed in the firebox of the kitchen range will answer. There should never be a valve at the pump spout, for it is thru this opening that provision is made for the expansion of water in the tank.

If cold water is desired, turn the handle of the three way valve up and operate the pump. If hot water is wanted, turn the handle of the three way valve to left and operate the pump as before. In this case we get hot water at the sink by pumping cold water into the range boiler. If hot water is desired without pumping, simply turn the handle of the three way valve to the right and open air cock (B). In this case the water siphons back thru the boiler feed pipe to the sink.

If there is danger of freezing at night or if the house is to be vacated for sev-

eral days during cold winter, the water may be drained by turning the three way valve to the right and raising the handle of the pump as high as possible. This causes all the water to siphon back into the cistern except about a gallon in the bottom of the tank which may be drained by opening the boiler drain cock. Ordinarily there is no danger of the hot water in the range boiler freezing over night. In which case, all that is necessary is to drain the water out of the pump and pipes by turning the three way valve to the left, opening the air cock (A) and raising the pump handle as high as possible.

Nothing will be lost even tho a man later becomes able to install a more elaborate water supply, for the present equipment may be utilized to furnish the hot water by merely connecting the boiler feed pipe with the supply pipe of the new system.

CHOOSING A SPRAYING MACHINE

Things to Consider in Reducing the Expense for Time and Labor

W. H. GOODWIN, Ohio Agricultural Experiment Station, Wooster

THE question of the kind and size of a spraying machine to buy confronts every fruit and vegetable grower.

Capacity must be considered as of first importance, but hand in hand with capacity must go quality, and quality involves material, workmanship, design and weight. A pump should be so designed that the parts are strong and so it will not wear out or need adjusting in less than a few weeks' use. If parts wear or get out of adjustment, the machine should be so designed that it can be taken apart readily and adjusted without the use of special wrenches and tools. All parts should be well machined and each part from one machine should be interchangeable with the corresponding part of another

machine of the same kind. This simplifies the replacing of broken or worn parts in case it is necessary.

The machine chosen should be large enough to do the work economically without involving too great an investment. Ordinarily the different classes of machines should be chosen because of their adaptibility for certain kinds of work. Bucket, knapsack and auto or small compressed air sprayers are best suited for the small garden or owner of only a few trees.

Barrel pumps will take care of a larger amount of truck and fruit crops but sometimes are not preferable to the smaller pumps on account of portability. An orchard of 1 to 2 acres will be all a pump of this capacity should take care

of economically. Larger areas of 2 to 4 acres of bearing orchard are more readily sprayed with a platform pump. The long leverage and the standing position of the operator permit more liquid to be pumped with less expenditure of energy. The pressure obtained is also slightly greater with a resultant saving in material and more effective covering with spray.

Bearing orchards of more than 4 acres, especially if the trees are large, require a power sprayer to effectively spray the orchard at a minimum of expense for time and labor. Some men find it profitable to own a power sprayer for a smaller orchard than 4 acres, but this depends upon the locality, age of orchard and the man who cares for it.

The capacity of sprayers per minute and pressure range about as follows:

	Cap. per Min. Gallons	Pressure Pounds
Bucket pump.....	$\frac{1}{4}$ to $\frac{1}{2}$	30 to 60
Barrel pump.....	$1\frac{1}{2}$ to $2\frac{1}{2}$	60 to 100
Platform pump....	4 to 4	100 to 150
Small power outfits	4 to $6\frac{1}{2}$	100 to 200
Large power outfits	6 to 11	100 to 250
Park sprayers.....	15 to 25	250 to 400

Few men just entering the ranks of successful orcharists realize the necessity of good first class equipment. Too often the limited means of the beginner influences him to purchase a cheap spraying outfit. In 2 or 3 years, and

often in less time, this spraying outfit is worthless and must be discarded.

The things actually needed with a man power spray pump are given in the following list.

One spray pump, 35 to 50 feet of $\frac{1}{2}$ inch high pressure hose, 2 double length hose connections—1 standard female connection and 1 male connection with $\frac{1}{4}$ inch pipe thread; 4 Sherman hose bands or 2 never slip hose clamps, 1 $\frac{1}{4}$ inch leakless cutoff, 1 spray rod, 10 feet long, and 1 disc spray nozzle.

The power sprayer is generally more efficient than the hand operated spraying machine, as the higher pressure forms a finer, more driving and better carrying spray that reaches and covers every part of the tree without the excessive wasting of material and labor. Sometimes it is best for each farmer to own a small sprayer, but wherever it is possible a power machine owned or leased by a community or Farmers' Club will give better results than hand sprayers and at a minimum of expense.

Labor cost varies with the machine, running from 3 to 10 cents for spraying a tree once with a power machine to 18 to 37 cents per tree with a barrel sprayer. This is labor cost only and the cost of spraying material and the interest on the investment are not considered in this cost estimate. Extremely large, tall trees would cost still more and could scarcely be sprayed successfully with a barrel pump.



GETTING INFORMATION TO THE PUBLIC

Some Successful Departures in Experiment Station Publications

L. L. RUMMELL, Ohio Agricultural Experiment Station, Wooster

IN our present era of rapidly increasing activity and revolutionary methods, social and industrial, the cry of a "new agriculture" is continually dinning in the ears of the man on the farm, of the instructor and of the investigator. While the sound is exaggerated in many cases, still it does record the drifting tendencies of today's agricultural world. Increased knowledge and skill in research, enhanced powers of disseminating the truths exposed, and greater precision and care in farming operations are demanded in agriculture, just as advancement in other professions has resulted in improvement of essential methods.

It is not surprising that all concerned institutions should fall in line in the advancement of this science. New departures in the field of agricultural journalism are not outstandingly distinctive features in agriculture; they are but results of present demands. A new type of farm journal will dominate the field within a few years hence, while the older style will be relegated to the background thru its own inability to progress.

Likewise, the publications issued from the experiment stations will pass thru an inevitable change that will increase their accessibility to the constituent public. In other words, these institutions are coming to recognize that they must cater to public demands if they are to maintain their reputation, not only as research institutions, but also as means of disseminating authentic practical information on the subject with which they are charged. They realize that there is hidden away within their walls sufficient information

that if taken out and properly applied would more than double the production of foodstuffs in this country. The means of putting this information before the public properly has been their problem.

Problems in Station Publications.

This question has been discussed repeatedly at the annual conferences of the representatives of the experiment stations ever since their establishment in the eighties, and at the individual stations it has likewise been under consideration. While it is an old topic of discussion, the last few years has seen it become of even greater concern because of the demands of a busy reading public, of a strict field of competing publications, and of differently organized administrative agencies. In other words, the publications of the agricultural experiment stations must be changed from their former types, because their contents are largely unavailable to the average reader thru necessarily dealing with detailed and technical matter, because other publications as the farm and daily press sift out the interesting and essential and then serve it in a more pleasing, useful style; and because the functions of the experiment stations, in a close relation to the agricultural colleges and extension services, are being more sharply marked.

The entire scheme of experiment station publications is still in an experimental stage. It has been but within recent years that any of the stations had special editors to supervise their publications, and in 1915 there were but five such men in the United States. Each station has tried to solve the

problem as peculiar to the particular state. Some states have a simplified system including only an annual report, bulletins and circulars, while others have as many as seven series for different classes of readers. A questionnaire sent by the writer to all the stations last year showed that 27 differently named series are being maintained. This example alone will show how great the lack of uniformity is among them.

as circulars of information and press matter being taken over exclusively by the departments of agricultural extension. Such an action manifestly restricts to a small field the publications of the experiment stations.

Periodical Publications.

Still, the stations cannot serve their one purpose of acquiring information and then fail to use every available means to put the information before the public as quickly as possible. Their



View of Buildings at the Ohio Agricultural Experiment Station

Federal enactments have also placed restrictions upon the publications of experiment stations. Projects reported under the Adams Act of 1906 must be stated with particular precision. Then, the Smith-Lever Act of 1914, which gave a great impetus to agricultural extension in all the states, still further defined the limits of the work of experiment stations. They are primarily research institutions, and work of a general nature which cannot be classified as scientific investigation should be issued from the extension division. Hence, we see such former publications

investigators carry on efficient work in the laboratory and field; the colleges are fortunate in possessing capable men to teach these results. Yet, how small is the number they reach by their instruction in comparison with the number on the 6,000,000 farms in this country.

Bulletins and circulars have been one means of disseminating the results of experiments. Their value alone cannot be estimated, for while they are of great aid in themselves they are even more important as the basis for the information contained in the journals

that farmers call "practical." From a detailed study of farm valuations and crop yields in Ohio, the writer found that since the establishment of the Ohio Agricultural Experiment Station at Columbus in 1882, the highest-priced farms and the greatest increases in crop yields occur in counties where the greatest number of bulletins are read, and as the number of bulletin readers decreases so likewise do farm values and increases in crop yields decline,

has the advantage of reporting seasonal information in condensed, practical statement, and at the same time is looked for at stated intervals just as a farm paper.

These features have caused the Monthly Bulletin to meet with favor among the farmers, opinions from whom are most complimentary. During the first six weeks of 1917, 308 readers sent to the Ohio Station an expression of opinion regarding this pub-



New Dairy Building, Ohio Agricultural Experiment Station

even tho the counties of few readers lie in sections of greater original fertility.

The latest development in the publications of the agricultural experiment stations is the Monthly Bulletin, as now published at the Ohio Station. By this plan all technical data are reported in the original bulletin series, technical in nature and limited in distribution to workers in agricultural science; while for the general mailing list the periodical publication contains several brief, timely, nonscientific articles from different departments of the Station. It

lication, and of this number 304 called it a decided improvement over the former technical bulletin and circular series, and 209 said they file the bulletins for future reference.

Farm and Daily Press.

Even this means, however, has not allowed the experiment station sufficiently wide dissemination of the results of investigation, and accordingly press bulletins are issued weekly, the mailing list for them comprising 650 daily and weekly papers in Ohio and 250 agricultural journals outside the State. Only the results of experiments,

such as published in the formal bulletins, are issued in the press service; the extension service of the College of Agriculture publishes popular information of a general character based upon work done at any station or college and on farm practices.

At present, at least 450 newspapers in Ohio make use of this press service, 30 farm papers received at the Station library have contained some of the stories. Thus, the experimental results are put before more than 3,000,000 readers in Ohio, duplications in subscriptions excluded, and a like number outside the State. Can one wonder why the press is regarded as the greatest means of all yet employed for the dissemination of agricultural information before the public?

The bulletins convey valuable information and are carefully read; yet the Ohio Station has a mailing list of only 60,000, and this today is nearly the largest of all the experiment stations. But thru the medium of the press the same results are presented periodically in short, terse stories that give the meat of all the conclusions, and millions of readers are reached.

A like opinion was expressed by Secretary of Agriculture Houston in his report of 1914, when he said that the United States Department of Agriculture, after several years of study and survey, had concluded that, aside from practical demonstrations on farms, the agricultural journal and then the newspaper are the most efficient means of disseminating agricultural information. The farm paper stands first because it is exclusively agricultural; the daily and weekly papers, on the other hand, contain a vast amount of matter foreign to farming. As an instance of this fact a survey in Minnesota may be cited. There it was found that 67 per cent of the circulation of weekly newspapers in that state is among local farmers, but only four-tenths of one percent of all the news is constructive farm news.

As the relation between these agricultural educational institutions and the press becomes closer, a greater amount of space will undoubtedly be devoted to agriculture, and more fruitful results will be attained both to the experiment stations and to the public.





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EDITORIAL

AGRICULTURAL ENGINEERING.

A striking feature of the agriculture of the past century has been the remarkable development of the machinery used on the farm. During the early part of the century very little work on the farm was done by machinery but by the end of the century the grain binder had taken the place of the cradle, the farm engine the tread power, the grain separator the flail and many other machines were brought into use, thus displacing old hand methods which were crude and inefficient.

Along with the development of any phase of agriculture or any other industry comes the need of training or education of men for that work. As in these other lines, departments of agricultural engineering and farm mechan-

ics have been placed among the subjects taught in our agricultural colleges.

During the present year at the Ohio State University 500 students in the College of Agriculture have enrolled in courses in the department of agricultural engineering. So great has been the increase in the numbers taking work in the department that the laboratory which has accommodations for only 100 students has become inadequate and it is feared that unless more floor space can be gotten some of the courses in the department will have to be discontinued. The need of a building for the teaching of agricultural engineering at Ohio State becomes more apparent when it is considered that offerings have been made by implement com-

panies to place farm machinery valued at \$150,000 in such a building if it were erected.

Besides teaching the regular students enrolled in the College of Agriculture, the department carries on extension work and many questions which come into the office daily are answered by some member of the department. Recently the department has almost been swamped by requests from farmers to advise them as to the proper building and drainage plans to use. They have also during the past few months assisted in making levels for draining farm land and have furnished plans for country homes. By applying modern farm architectural methods, the department has actually saved farmers from \$200 to \$500 on buildings erected from plans they have furnished.

FARM PAPERS.

That farm papers have played an important part in the development of our modern agriculture cannot be doubted. As a medium for the spreading of information from the agricultural experiment stations and colleges into every community they have been invaluable. It has been found that the highest priced farms and the largest increase in yields in Ohio occur in those counties which receive the largest number of bulletins from the Ohio Agricultural Experiment Station. Evidently, the value of these bulletins as well as farm papers themselves are determined by the readers themselves.

The farmer tired from his day's work too often gives his paper to little attention, reading hastily the more important articles and missing those less noticeable which may be of most value to him. Probably at no time would it be profitable for the farmer to read all the contents that appear in any one issue of a farm paper as it necessarily must cover

a wide range of topics which cannot be of interest to all people. But on the other hand it cannot be denied that there is much in a farm paper that can be read with profit and that the person who gets the most from reading is the one who reads the papers most closely and takes the experiences of many rather than just limiting himself to the experiences of the farmers in his immediate community.

It is true that there are men who are writing for farm papers that are not reliable but their writing constitutes only a very small percentage of the reading matter which appears in our best farm papers today. A factor that has led farmers to the idea that men writing in farm papers are not reliable is the fact that the men writing from their own experience under different conditions have gotten different results than can be gotten in the locality where the reader is situated. Because of getting contrary results they have condemned the farm paper without considering that what is good for one locality is not good for another. In reading a farm paper all these factors should be given their full consideration. No one should give too much weight to any one man's writing but the experience of many should be taken. It should be remembered that in most cases the articles in our farm papers are merely the narration of facts that men have gleaned from their own work and under their own peculiar conditions and they should be taken as such.

Education is a slow process and is largely the result of imitation or learning from others. By presenting the experiences and results that have been gotten by others as well as those gotten by our agricultural colleges and experiment stations, the farm paper offers itself as a medium for furthering agricultural education.

TRACTOR VS. HORSE.

The tractor has taken a definite place in American agriculture. The rapid progress of the 20th Century has pervaded the farmer's domain. Automobiles speeding along the highway have set the farmers to thinking and those who keep abreast of the times are no longer content to follow a single plow drawn by horses. On those dry, hot August days when the plow raises a cloud of dust behind it, and the horses come in from the field covered with foam, men with kind hearts welcome the coming of the tractor.

Some have expressed the opinion that the tractor would not be a success on our farms. But we read that this same class of conservative men fought the coming of the reaper, the mower and all the other machines that have done so much to emancipate the farm laborer from slavish toil. Again they object when our progress leads us still farther in the substitution of mechanical power for muscular labor. As in times past actual utility must silence their objections.

The tractor offers many advantages as well as disadvantages when compared to the horse. It will work long periods without fatigue; it concentrates a large amount of power and is capable of great speed, but on the other hand it will not stand abuse. A horse can be worked on poor feed and with little care. The tractor soon refuses to work unless it is given proper attention. For this reason low class labor cannot be employed in tractor farming.

In the past horse labor has been substituted for man labor. As a result the horse is an overworked individual at certain seasons of the year. Something must be done to cut down these periods of excess horse labor and the tractor offers a solution of this problem. On most farms too many horses are kept during

slack seasons because they are needed in the busy seasons. This is not a profitable procedure. Here again the tractor comes to the relief of the situation.

The tractor cannot be expected to take the place of the horse entirely but it can be made to supplement him. The tractor is too clumsy for many kinds of farm work, but it fills a great need where a large amount of power is needed. The horse has a place and a large one too. It should be hoped that horse lovers will soon recognize that the tractor will not drive the horse from his job, but that it will merely make his lot an easier one.

WATER IN THE HOME.

Since water is a universal need it is evident that some method of supplying it should be installed in every home. There are many farmers that still use the old method of carrying water from the pump to the house and leaving it in an open bucket. This is not only a cause of extra steps for the house wife but is inconvenient for the entire family. The open bucket is unsanitary for it catches the dust and disease germs that are constantly floating about in the air. Furthermore it is much easier to install some sort of closed system so that the water can be secured by the turning of a faucet than it is to go out in the snow, rain, or mud after it.

Some method could be installed in many farm homes which would bring the water into the house at a very small cost, certainly not exceeding \$50. The pleasures and satisfactions derived from such systems are often worth the cost of them.

Water systems in the homes are indicative of progressive farmers. After one has become used to a water system in the home it is hard to understand why all farmers do not install them for the sake of their wives if not for their own.

Home Economics Department

CONDUCTING AN EIGHT-WEEK CLUB

MILDRED GREDING, '17

ORGANIZING Eight-Week Clubs is a recent movement which has not yet reached many small towns and rural communities. Because of the natural barrier of miles and the unnatural barrier between the country and the town, the country girl is often missing the big-ness of friendship that is afforded her city cousin. The Young Women's Christian Association, keenly sensitive to the needs of all, is finding ways to serve these girls. One way is thru the service of college girls, who organize during the summer vacation in their home community these Eight-Week Clubs, so-called because they meet for 8 weeks and give the girls an opportunity for friendship, play and for education.

The plan for conducting an Eight-Week Club is flexible and depends to a large extent upon the standards and the kind of community and upon the leader. The work of the club must be fitted to the locality with the aim of strengthening the organizations already there, bringing the girls added loyalty to their homes and community and a keener appreciation of their surroundings. The leader must make a sympathetic study of conditions of the community in order that her program of action will fit the needs in a sane way. There must be a disregard of petty gossip, a continuing remembrance of all the girls, a fine true cooperation with all established organizations, especially the churches and the Sunday schools, and a constant use of all the local leadership resources that can contribute to the life of the girls. Entertaining the girls is not the chief purpose, and this

must be kept continually in mind. The girls should stand for unselfish helpfulness and learn the spirit of cooperation as well as have a deep interest in things worth while and useful.

During the past summer one of these clubs was conducted in Bluffton, Ohio. In this village are several college girls who were used as a nucleus in the work. There were five interests that were taken up, namely, interests in social activities, educational lines, practical work, recreation and another that was termed "inspirational work." One girl was made responsible for each activity which was always planned before the regular club meeting.

It was aimed to always have the club meeting begin and end promptly, lasting 2 hours. An opportunity for social times was offered while the girls were assembling and it was probably here that the spirit of cooperation was best developed. A lecture on first aid to the injured was given at each meeting or some topic as "Care of the Teeth," "Camp Life," "Nursing" or "Standards of Dress" was discussed by the educated men and women of the village.

One of the main purposes of the practical work was to teach the girls to be of service to each other. The girl who could crochet best, taught the others. In this way all sorts of needle work and light sewing was taught. Cooking was taught by demonstrations and lectures while the practice work was done in the girls' own homes. Recreational work was carried on outside of club hours for the benefit of the working girls. Walking to nearby

towns to see the townspeople as they begin their day's work seemed a special treat to the girls. Baseball and tennis were the chief forms of athletics, and a class in Indian clubs was conducted weekly on the village school ground. In the inspirational work, an "Every Girl in the Sunday School" campaign was held, and also joint vesper services for all the churches.

Some community service can be done by every Eight-Week Club. The rest room in the village was supplied with flowers and kept clean and comfortable. During Chautauqua week, the girls relieved the mothers by taking care of the children so that they could attend the meetings without being continually annoyed. At the end of 8 weeks, the girls felt that they knew each other better and that they had been greatly benefited by the work of the club. Thru work and cooperation the barrier which formerly existed between the girls was removed and now each girl feels free to speak and talk with most every girl in the village whom she was afraid to approach before.

TESTED RECIPES

Soft Custard or Float

2 cups milk	$\frac{1}{2}$ cup sugar
3 egg yolks	$\frac{1}{8}$ teaspoon salt
$\frac{1}{4}$ teaspoon vanilla	

Scald the milk. Beat the eggs slightly and add the sugar and salt. Pour the hot milk over the egg, stirring constantly. Cook in a double boiler until the mixture thickens and a coating forms on the spoon. If it begins to curdle, set the upper part of the boiler in cold water and beat with an egg beater. Strain if necessary. Cool and flavor. If desired, the whites of the eggs may be beaten stiff and sweetened, using one tablespoon of sugar to one egg white, poached in hot water, and

served on top of custard or they may be beaten stiff and stirred in with the custard while hot.

Cream Filling

$\frac{3}{4}$ cup sugar
2 cups milk
$\frac{1}{3}$ cup flour
2 eggs
$\frac{1}{8}$ teaspoon salt
1 teaspoon vanilla

Mix sugar, flour and salt with a small portion of the milk and add to the remainder of the milk which has been heated. Boil. Add slightly beaten eggs and cook for a few minutes. Cool and flavor.

Cream Cakes

$\frac{1}{2}$ cup butter
1 cup boiling water
4 eggs
1 cup flour

Heat the water and butter in a sauce pan until the water boils, then add the flour and stir vigorously. Remove from the fire as soon as they are thoroly mixed and add the eggs, unbeaten, one at a time, beating vigorously each time. Drop by spoonfuls on a buttered muffin pan. Bake for 30 minutes. When puffs are cool, make an incision in the side and fill with cream filling or whipped cream. If removed from the oven before thoroly cooked the cakes will fall.

Chocolate Bavarian Cream

2 tablespoons gelatin
$\frac{1}{2}$ cup cold water
$\frac{1}{2}$ cup milk
$\frac{1}{2}$ cup sugar
2 squares chocolate
2 cups cream

Soak the gelatin in the cold water. Heat the chocolate and milk with the sugar. Add the gelatin to the hot mixture and dissolve. Remove from the fire and cool. When it begins to thicken stir in the whipped cream. Pour into moulds and keep cool.

TEACHING AGRICULTURE IN THE HIGH SCHOOL

J. L. CLIFTON, College of Education, Ohio State University

A FEW years ago the legislature passed a law which requires that agriculture be taught in all the public schools of Ohio, cities excepted. The law was and is popular in as much as agriculture is the leading industry of the state. We have been teaching facts in our schools so long that we have come to measure the teacher's efficiency by the number of facts he knows and at the same time we have applied the same measure to the schools. Facts in the study and teaching of agriculture are only incidental. The most necessary factor is experience. When the law was passed many texts were offered for use in the schools. Each text book offered had some merit, but agriculture cannot be taught with much success from text books. This subject is not cultural but industrial, and should be taught as such. When courses of study were formulated for the high schools within the last few years, agriculture was given a minor credit, so we must not be surprised at the results.

The Teacher

Teachers were used to having additional subjects added to the course of study and to the requirements for certificates to teach, as literature had been added a few years before; physiology a few years before literature, and so when agriculture was added it caused little disturbance among the teaching force. Most teachers feel they are more or less qualified to teach agriculture, and for that reason the subject is poorly taught in most high schools of the state. Only about one in ten of the teachers teaching the subject in high schools is in any way competent to teach agriculture. This does not mean the teacher is at fault, but that the sub-

ject is not taken seriously by the school authorities. The teacher consents to teach agriculture on account of it completing the required number of subjects for the day's schedule, or on account of the fact that he teaches the other sciences or because he has lived on a farm. Just analyze the attitude of such a teacher and it is easily seen that under such circumstances the best results are not possible. Then who should teach agriculture? Only such teachers who have a love for the work and believe that agriculture is the noblest, healthiest, and best of professions should attempt it. Therefore we must train our teachers for this work as carefully as we train leaders for all other professions.

The Student

When we have the subject scientifically developed and the teacher employed who can teach the subject, we will look for the students. However, at the beginning all students who desire to choose the subject for the credit should be eliminated and only such students should be accepted who have prospects of developing the proper attitude and interest. Then again if possible, the boys should be taught different phases of the subject from that of the girls. This necessitates the separation of boys and girls as far as agriculture is concerned. Many applications of the subject that are fundamental to boys are only incidental to the girls and vice versa. No boy or girl should be allowed to study agriculture for the facts possible to be accumulated by such study. This abuse is the great handicap of the subject at the present time. When we are able to offer high school boys and girls a 4 year high

school course with agriculture as the major subject and when such a course is intended to develop expert farmers and farmers' wives, then, and not until then, will the students of agriculture have equal opportunities with other students. This is not a dream, but just a reflection of what is now at hand and even now many of the high schools of the state are planning such courses.

The School

The Smith-Hughes law recently passed by Congress will give the schools of progressive agricultural districts the opportunity to develop just such schools as have been anticipated in this discussion. The purpose of agricultural high schools should be to train boys and girls in a specific way for a specific work. The equipment of the school should be the most up to date possible. Text books, if used at all, should be for reference only. The College of Agriculture of the Ohio State University should be in constant touch with the school and its activities. The advice and counsel of the experts in this department and of the Ohio Agricultural Experiment Station should be freely sought. Government bulletins should be at hand, and also 2 or 3 of the best

agricultural papers should be taken by the school. The school must come to be the headquarters of all research work where expert advice could be given the people of the community on many phases of the work of the community. The school should not attempt to teach all that is offered in the field of agriculture, but should emphasize the problems of its own environment.

Results

The results of such a school are evident. No one doubts the value of agricultural schools, but much objection is offered on account of the cost. It costs very little more to maintain efficient schools than inefficient schools. One teacher who is properly trained and who is in sympathy with agriculture can do much good in any high school. The cost is no more than when haphazard teaching of the subject is tolerated. Therefore, to sum up the purpose of this article in just a few words, I can do so by just one principle of education. To do anything as it should be done, one must have initiative, knowledge of the subject, sympathy, accuracy and perseverance, all of which qualities are necessary in a teacher.

Jesse E. Whonsetler, '16, is assisting with the work of the boys' and girls' clubs which are being conducted by the extension department.

William L. Clevenger, '06, has accepted a position with the dairy division of the United States Department of Agriculture. He will have charge of the demonstration work in dairy manufacturing in the states of Tennessee and North Carolina and will make his headquarters at Knoxville, Tennessee. Since graduation Mr. Clevenger has been an instructor in the department of dairying at Ohio State University. He had

charge of the work in buttermaking and dairy manufacturing.

Earl L. Bowser, '06, is manager of the Helvetia condensing plant at Westfeld, Pa.

Harry C. Ramsower, '06, is head of the department of agricultural engineering at the Ohio State University.

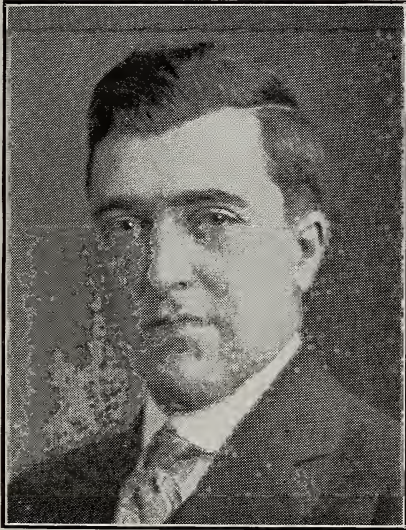
Leland E. Call, '06, is head of the department of agronomy at the Kansas Agricultural College and Experiment Station at Manhattan, Kansas.

Andrew S. Wing, '15, is with the Wing Seed Company at Mechanicsburg, Ohio.

Alumni

What The Bus Grads Are Doing

Ray Fife, '17, who has recently been appointed assistant state leader of boys' and girls' club work for the extension department was born and raised on a farm near Van Wert, Van Wert County, Ohio. Mr. Fife received the



degree of Bachelor of Science from the Ohio Northern University at Ada in 1909.

Since then he has been a district superintendent of schools in Van Wert County for 5 years and for the past 3 years he held the position of county school examiner in connection with this work. He also had charge of the school exhibits at the county fair and the boys' and girls' club work in that section.

The boys' and girls' club work as conducted by the department of agri-

cultural extension will cover more than 50 counties this year with activities in livestock judging, pig and poultry clubs, home-making clubs for girls and corn and potato-growing clubs. Mr. Fife will have charge of the work of the corn growing clubs this season.

Sherman L. Anderson, '16, is creamery inspector under the license division of the dairy department at Purdue University, La Fayette, Indiana.

Edwin Hibbs, '14, visited the University campus while on his vacation trip. He is in charge of the agricultural high school at Albert Lea, Minnesota, the largest of its kind in the state.

W. W. Canaga, '16, is fertilizer salesman for Swift and Company.

C. M. Fritz, '12, has accepted a position in the grain standardization division of the United States Department of Agriculture. He will work under the direction of Mr. Duvall. Fritz formerly did nutrition work at the Ohio Agricultural Experiment Station.

Edward C. Clayton, '16, is taking advanced work in horticulture at the University of Chicago.

W. D. Elser, '10, is now assistant state leader of county agents in New Mexico.

Carl T. Colt, '15, has accepted a second lieutenancy in the regular army of the United States. He recently returned from the Mexican border where he was color sergeant in the University regiment.

Lott E. Bechtel, '16, is chemist for the John Wildi Evaporated Milk Company at Bainbridge, New York. He was instructor in dairying for the winter course students and has just recently accepted his present position.

Joel L. Foote, '16, is doing vegetable gardening at Brooklyn Heights, near Cleveland.

Robert L. Early, '16, is in the grain commission business at Cincinnati, O.

Robert L. Fleming, '14, is instructor of agriculture in South High School at Youngstown.

Dwight C. Ginn, '16, teaches physics and agriculture and coaches athletics in Findlay High School.

Edward T. Kirkendall, '14, M. S. '16, is now connected with the agricultural extension department at Purdue University, La Fayette, Indiana, as a farm crops expert.

Hays Dill, '14, is operating the Maple Hills Farm at Washington C. H., Ohio. He is making a specialty of Belgian horses and is secretary of the Ohio Belgian Horse Breeders' Association.

R. O. Bell, '14, is running a dairy farm at Signal, Ohio.

J. M. "Red" Trautman, '14, is coaching athletics at Ohio State University and is connected with the department of physical education.

Charles C. Ensign, '14, is farming at Bryan, Ohio.

Hubert Conarroe, '15, is principal of the high school at Sharon Center, Ohio.

Uri F. Bruning, '16, was elected president of the local organization for a Farmers' Institute at Pemberville, near where he is farming.

Hubert W. Bower, '15, is farming at Creston, Ohio.

Herbert L. Andrew, '15, is with the department of farm management at the Ohio Agricultural Experiment Station at Wooster.

Arthur S. Kennedy, '15, is teaching high school agriculture at Medina, Ohio.

Burns L. Childs, '15, is farming at West Middletown, Ohio.

Arthur S. Keifer, '15, is teaching gardening and coaching athletics at North High School, Columbus, Ohio.

Robert R. Barker, '16, and wife have recently become the parents of a baby girl. Mr. Barker is assistant chemist at the Ohio Agricultural Experiment Station at Wooster.

Harry U. Simmermacher, '15, is managing the Daisy Hill Farm at Chagrin Falls, Ohio.

Earl Baumiller, '13, is running a dairy farm at Hartsford, Trumbull County, Ohio.

Sidney M. Fenn, '16, is teaching agriculture in the high school at Kingman, Ohio, in Highland County.

W. Dayton Axtell, '16, has charge of the Fowler-Hartford Cow Testing Association at Fowler, Ohio.

Reiber Studebaker, short course '17, is farming at his home in Tippecanoe City, Ohio.

C. V. Rule has charge of the cow testing association at Westerville, Ohio, known as the Westerville Cow Testing Association.

Robert Garbaugh, '15, is employed by the Libby, McNeil and Libby Company at their condensing plant at Gunean, Wisconsin.

Max M. Phillips, '16, is located with the Pure Milk Company at Canton, O.

Louis F. Bower is operating a farm as well as being superintendent of a high school near Chillicothe, Ohio.

Ray Donley, '15, is running the home farm at Ravenna, Ohio.

Harry C. Patterson, '16, has a position with the Recording Computing Company at Dayton, Ohio.

Carl Eichorn, '14, is assistant to Mr. Thomas D. Phillips in the rural economics department.

Joseph Cross, '16, is with the Mojonier Company of Chicago. His position is traveling salesman. Recently he placed a large tester in the dairy laboratory in Townshend Hall.

George H. Stutz, '16, has just returned from the Mexican border.

Karl S. McComb, '16, has returned from the Mexican border.

Joseph Hale, '14, is with the Canton-Akron Pure Milk Company, located at Akron, Ohio.

UNIVERSITY COWS COMPLETE RECORDS

CARL R. ARNOLD, '19

MADAM COLANTHA BAKKER, a Holstein-Friesian cow owned by department of animal husbandry, Ohio State University, has recently made a record by producing 19,857 pounds of milk containing 923 pounds of butter in 1 year.

She is now about 5 years old and weighs 1485 pounds. Her development was watched with keen interest, and during her second lactation period she was placed upon a year's test. During this test she was given no special care or feed to raise the milk production but was fed silage and a grain ration, and during 10 weeks of the year, owing to the scarcity of leguminous hay, she was fed upon timothy.

This record places her well up among the dairy cows owned by agricultural colleges. When one stops to think that

the average cow kept in Ohio for dairy purposes produces only about 3500 pounds of milk a year, her ability becomes more apparent. If the average dairy cow pays for her keeping, then how much more is this cow worth producing more than 5 times as much? In 7 consecutive days she produced 426 pounds of milk and 20.9 pounds of butter, while 71.3 pounds of milk were produced as a high record for a single day. Considering the average price of butter at 25 cents a pound, the result of the 1 week test would be \$7.32 or more than \$1 a day while the 923 pounds produced in 1 year would be worth \$323.05. This does not include the skimmed milk which figured at 35 cents a 100 pounds would be worth \$66.92, making a total of \$389.97 actually returned to the University.



Madam Colantha Bakker

Owing to the fact that the University cattle are kept largely for study purposes it is difficult to estimate the cost of their keeping, but \$200 seems to be an ample amount to cover the feed care, labor and supervision of this cow for 1 year. This would leave \$189.97 net profit and if this is to be taken as interest on her value one sees that she actually returns 6 percent on an investment of \$3166.16. She will calf

pounds of butter. Figuring her returns the same as in the former case, her net profits would be \$171.42 or 6 percent on an investment of \$2856. She also has offspring which are producing valuable returns to their owners.

These two cows, both from the same dam, did not just happen to acquire this ability to produce heavily, but they are the result of long and careful study.

Their clean cut and symmetrical



Ohio Colantha Bakker

again about October 10, and by considering her offspring, which in a few years may exceed the value of the animal herself, the net profits and likewise her value are greatly increased.

Ohio Colantha Bakker, a half sister to Madam Colantha Bakker, has shown almost equal ability by producing 19,532.7 pounds of milk which contained 873.72 pounds of butter in 1 year. Her record for 1 week was even superior to that of the former cow. In the 7 days she gave 536 pounds of milk with 23.09

features combined with their great capacity of barrel and udder attract the attention of everyone who happens to pass thru the dairy barn. If more of our farmers would consider the strong and weak points of their breeding animals and mate them in such a way as to secure the most desirable form and quality as well as the producing ability in their offspring, the average dairy cow would soon be producing more than 3500 pounds of milk per year.

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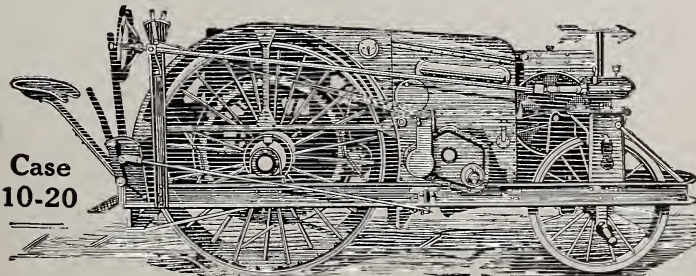
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FIRST CLASS OF THREE YEAR STUDENTS GRADUATES

GUY W. MILLER, '18

The first class of 3-year students in the College of Agriculture received their certificates of graduation on Friday, March 16. President W. O. Thompson gave the address and presented the diplomas to the class of 62 members, while the grange orchestra and quartet furnished music for the occasion.

Nearly all the graduates were farm

first established. Just why it has not come up to the expectations in numbers is a problem. The date of registration and the entrance requirements are such as to encourage a large number to enter from the rural communities. The fact that credit in the 3-year course cannot be transferred to the four has been a limiting factor. The curriculum



First Class of 3-Year Students Graduating From the College of Agriculture

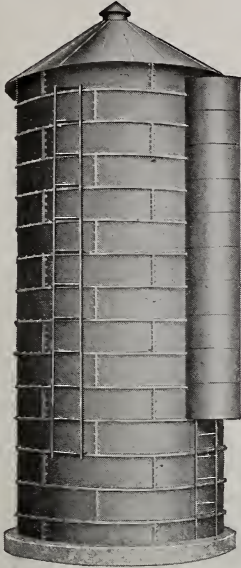
boys and 52 of their number have returned to the farm. Of the remaining 10, five will do vegetable gardening and five will take up cow-testing association work.

The enrollment of the first class in 1914 was 150 but many either changed to the 4-year course or dropped out so that at graduation only 62 were left. Registration in the short course this year totalled 225 which is below the 400 mark estimated when the course was

itself is practical for one who wishes to go back to the farm.

One of the most practical features of the required work is the farm project work which the students carry on at home between the second and third year. This is under the supervision of one of the instructors in whose department the project is chosen. It is selected from a list submitted to each student and the department then outlines a general plan together with specific in-

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THE GENESEE VALLEY POULTRY FARM, Castile, N. Y.

structions and directions. The nature of the projects varies with the department as in soil chemistry several last summer ran comparative tests with different brands and amounts of fertilizer on some farm crop and reported on them in the fall.

Among the problems taken up in dairying were various methods of feeding dairy cows, and in animal husbandry livestock conditions of the home township. In farm crops, experiments

the county agent nearest the place. At the beginning of the second semester a written report or thesis was handed in which when graded and found satisfactory entitled the student to 2 hours credit. This work has served to combine the knowledge gained in school with the practical methods of the farm. It has not only aroused the interest of the student but also of the parents and neighbors in the community.

The 3-year men have organized their



Magic, the Percheron Stallion Leased by the University

with varieties of soybeans and varying amounts of seed per acre were carried on with good results. Cost accounts were kept by the students in rural economics. Tests on pruning and spraying half the home orchard were conducted by the horticultural students. A census of the timber in woodlots was carried out by the students in forestry and experiments in onion culture by those in vegetable gardening.

This work has all been done under the supervision of the department or

own literary society, basketball team, orchestra and quartet. Despite the fact that they are barred from college athletics and some school activities they have gotten the real spirit of the university and proved themselves to be a valuable addition to the agricultural college.

MAGIC.

The University has leased the 2100 pound Percheron stallion, Magic, for use on the University mares. Magic

105931 (105686) was imported in June, 1914, by Dunham's of Wayne, Illinois. He was foaled March 2nd, 1912, and was bred by Dagoneau in the Department of Orne, France.

The sire of this stallion was Intelligent (79902) by Etudiant 70802 (59291) and he was in turn by Cronstadt 34112 (35219). Cronstadt was the sire of the noted stallion Dragon, which now heads the stud of Mr. E. B. White of Leesburg, Virginia. Magic does not lack for a pedigree on his dam's side, being out of Susanne (47859) by Reflector (44729). This sire traces on both sides to Brilliant the founder of the famous Brilliant strain of Percherons. Magic may be said to be a line bred Brilliant. He not only traces back to a line of prize winning individuals, several of which have been champions at the International Livestock Show at Chicago, but he himself won first as a 2 year old at the Minnesota State Fair.

Magic is a dark gray as to color, and in individuality is a horse of range standing 17½ hands high and being wonderfully well balanced from end to end. He stands on legs that are squarely placed under his body and show plenty of substance, yet exhibiting wonderful refinement for a horse carrying so much bulk. He is wide and strong of top, deep and drafty thru the middle, nicely turned over the croup and carries down into thighs and quarters that are typically Percheron. Magic stands on feet that are big and round, wide and deep at the heel and Scotchy in their makeup.

Mr. Holdridge, the owner of the stallion, is a farmer breeder at Marion, Ohio. He keeps 25 or 30 purebred Percheron mares, which not only do the work on the farm, but bring in a good profit in the way of their offspring. Holdridge has several colts sired by Magic that are showing up strong for



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the Eastern Futurity to be at the Ohio State Fair next fall. This stallion has shown himself to be a proven breeder and is certainly worthy of heading Mr. Holdridge's Stud.

B. C. ZIMMERMAN.

SENATOR BIBBY, JR.

Senator Bibby, Jr., the Shropshire ram, which now heads the flock at the Ohio State University farm was pur-



chased from George McKerrow and Son, of Peewaukee, Wisconsin. He is now 3 years old having been used for one season on the flock of Mr. McKerrow. This prize ram has been shown at several state fairs. At the Wisconsin State Fair he took first prize while at the Iowa and Missouri state fairs he won second place.

The ram is from the celebrated Sen-

ator Bibby strain and was sired by a ram named Senator Bibby. The sheep of the Bibby type are noted for their fine type but are criticised by some judges as being undersized. This criticism can be made of this ram. As an individual, however, he is very true to type, a little coarse in the wool but being well covered. During the past season on the University farm he has been proving himself to be a lamb getter of much merit.

L. L. MOORE.

ARRANGE POLO MATCH.

A polo match between members of Troop B of the Ohio National Guard, will be one of the features of the sixth annual Ohio State horse show to be given on Ohio Field on Saturday, May 5, by the Saddle and Sirloin Club. The troop participated in several polo matches with other troops on the Mexican border. The game will be played according to the rules of the National Polo Association with 4 or 5 players on a side.

A number of entries have already been received for the class of polo ponies. The ponies will be required to show their speed and agility by running diagonally between stakes driven in the ground 30 feet apart.

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saddle horses, ladies' mounts, a ladies' riding contest, hunters' military mounts, carriage and heavy harness horses, are being arranged. Prizes amounting to \$300 will be given as cups.

HORT SOCIETY MEETS.

"Successful Orcharding and Some of its Practices" was discussed by Frame C. Brown at a recent meeting of the Horticultural Society. Mr. Brown told about the use of the tractor, discussed efficiency in dealing with labor and described various markets. He emphasized the importance of selecting the market before choosing the site for the orchard.

UNIVERSITY GIRLS BECOME EQUITANTS

"The best thing for the inside of a man is the outside of a horse."

With this idea in mind Frank Tallmadge, of Columbus, organized at Ohio State University in the fall of 1916, the first equitation class ever held at any University. Mr. Tallmadge is probably the most enthusiastic friend of the saddle horse in Columbus and he found the field fertile due to a lack of knowledge on the part of the present generation in regard to saddle horses.

The class consists of 40 girls. The equitants came from the different departments of the University, but had a common interest in physical culture, all having decided to adopt this as a profession. Four of the members belong to the faculty, one being the head of the Women's Department of Physical Education. The class room work is carried on by lectures that cover "Mounting and Dismounting," "Control," "The Different Gaits and How Obtained," and a short history of saddle

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horses. The questions that the girls ask are carefully answered.

The equitants take notes and manifest unusual interest in their work throughout the lectures. Recently an examination was given consisting of practical questions that covered the field of the classroom work and the results were satisfactory in every way to the instructor. The practical work is given at Mitchell's Riding Academy, where the girls meet one night each week. Their love for the work is shown by the fact that they pay for the use of the horses during these lessons. Tallmadge proves to be just as capable a training master as a lecturer in the classroom.

At the academy mounting and dismounting becomes an actual practice rather than a theory. Some of the equitants are at times discouraged, but as they become accustomed to the saddle

and learn the management of a horse, the love of horseback riding grows upon them. One of the girls remarked that she will continue the work this summer by training a saddler on her home farm. Miss Meyer, Head of the Women's Physical Department, in commenting on the class, said: "The girls are securing more exercise and a much more helpful training than can possibly be secured in a corresponding length of time spent in the gymnasium."

Mr. Tallmadge feels confident that if suitable equipment can be provided more than 100 girls will take the course next fall. Some of the girls who have followed the work most consistently have become accomplished and a special event will be arranged for the girls in the Sixth Annual Ohio State University Horse Show to be held on May 5.

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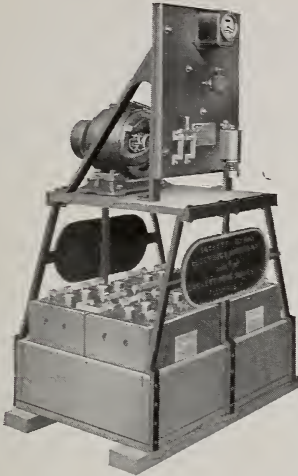
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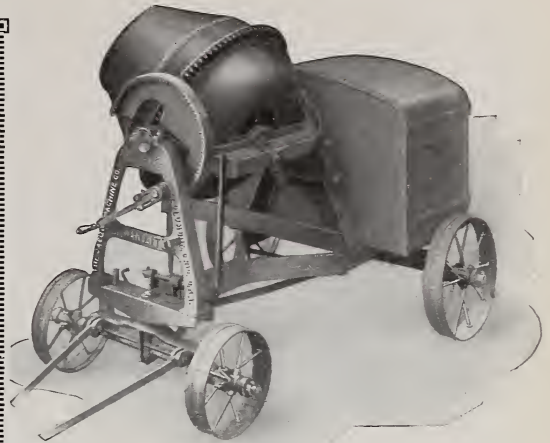


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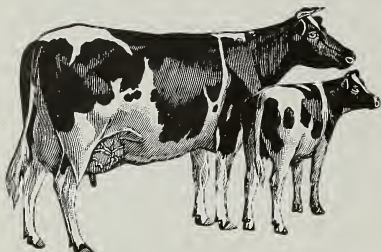
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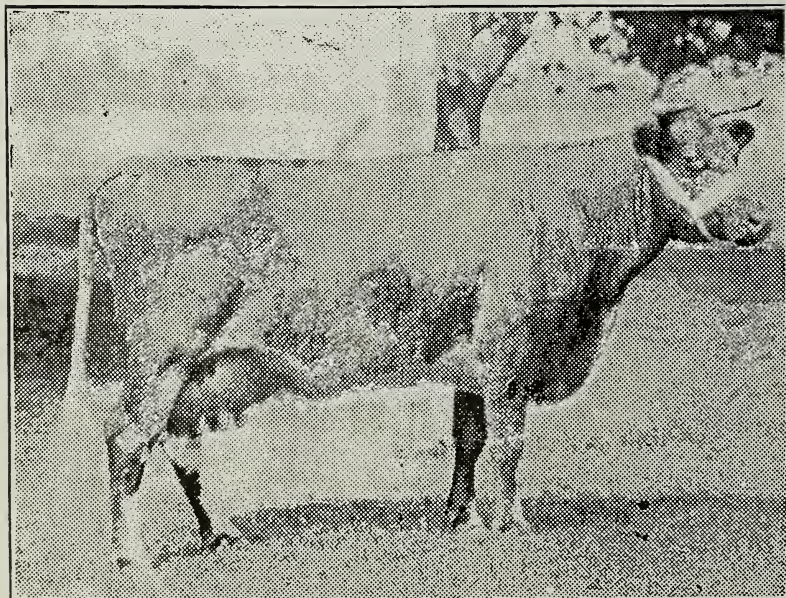
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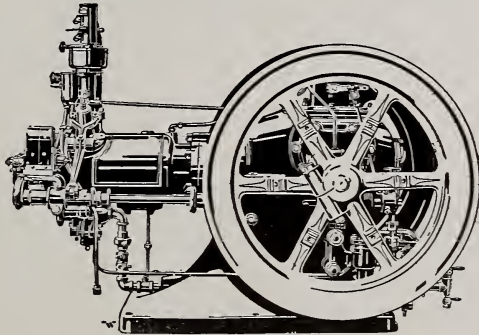
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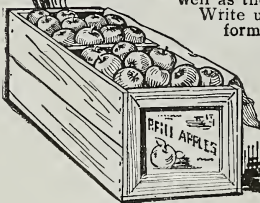
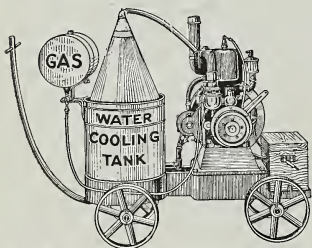
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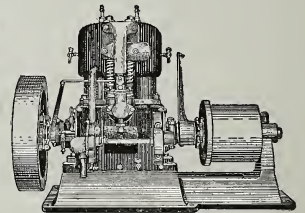
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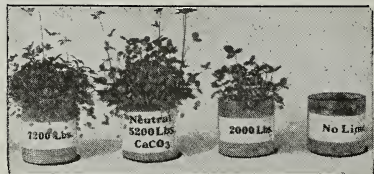
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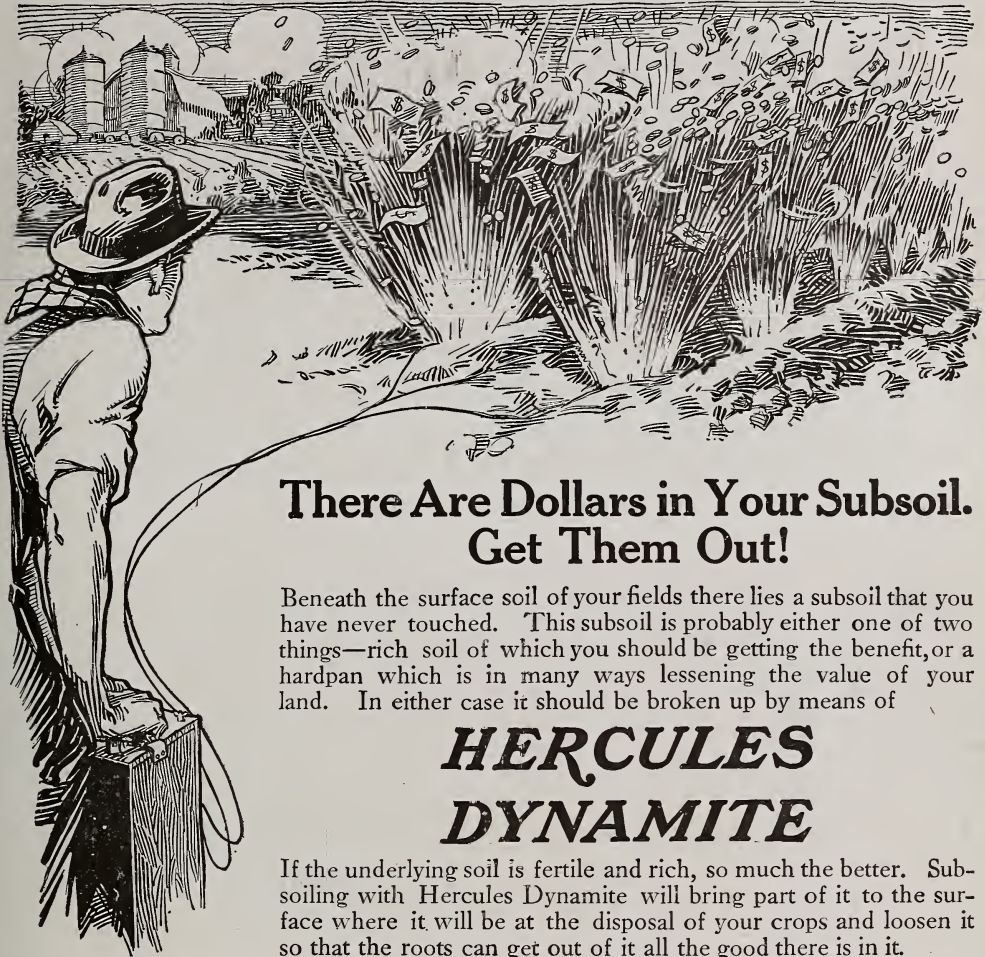
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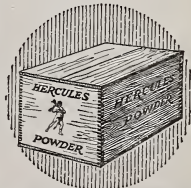
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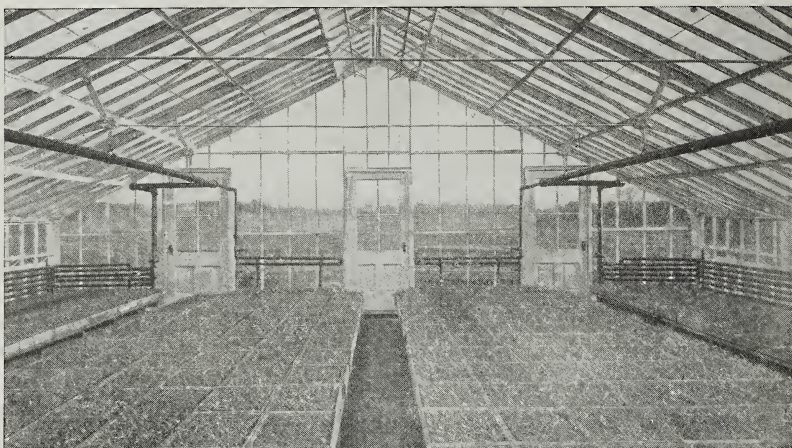
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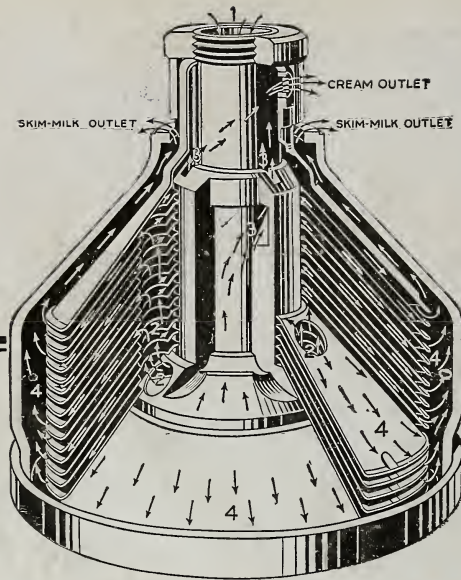
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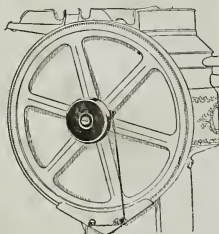
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